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Both solutions require improvement, the former, although later extended by Ross to represent 12 observations distributed uniformly from January 3, 1905, to September 25, 1906, because the satellite theory was based on approximate osculating elements and confined to the principal terms; the latter because of the shortness of the arc from which the preliminary osculating elements were deduced.

The author undertook the task of deriving an accurate set of osculating elements by a further application of LEUSCHNER's method, partly for the purpose of testing the advantages of certain closed expressions, partly in order to test the accuracy of certain directions for taking full account of the aberration, and, finally, in order to provide a set of osculating elements of sufficient accuracy to serve as the basis of any future rigid satellite theory.

The plan of work involved an extension of the special perturbations and differential corrections on the basis of increased arcs of the preliminary elements computed by CRAWFORD and CHAMPREUX; the revision of the perturbations from the date of discovery at the original eight-day intervals on the basis of the corrected elements, and ultimately with even shorter intervals; and a repeated representation of the available positions for the purpose of eliminating defective observational material.

The investigation is not concluded, but the first two objects: the proof of the advantages of LEUSCHNER's closed expressions for correcting satellite orbits and of the accuracy of the directions for taking full account of the aberration, have been attained, while another revision of the special perturbations with a subsequent differential correction of the elements should give an orbit representing the available positions within the errors of observation.

A. O. LEUSCHNER.

VOLUME XI, PUBLICATIONS OF THE LICK OBSERVATORY.

This volume, entitled "Photographs of the Milky Way and of Comets, made with the Six-Inch Lens and Crocker Telescope during the Years 1892 to 1895 by E. E. BARNARD," has just been distributed to the correspondents of the Lick Observatory in the United States, Canada and Mexico. The distribution to European and other foreign correspondents is delayed by the war. The volume contains reproductions, by the collotype process, of eighty-eight photographs of the Milky Way, and thirty-nine photographs of comets; also a plate of lunar photographs, one of the solar corona of January 1, 1889, and one showing the Crocker dome and the Crocker telescope with the Willard lens. In addition to the descriptions of the individual plates, Professor BARNARD's introduction gives a general account of his pioneer work in astronomical photography.

PERSONAL NOTES.

Director CAMPBELL cabled to the observatory from London on September 8th that all the members of the eclipse party were in good health. The censorship of cable messages, it is presumed, prevented the sending of any further news as to the success of the observations at Kiev. On the same day a letter came from the eclipse station, mailed by a friend in England, and dated August 15th. At that date the preparations were complete for the observations of the 21st. The party expected to travel via Moscow and St. Petersburg, thru Finland and Sweden, to England; and this plan was probably carried out. The preparations for the war in Russia would probably not interfere with the work of the eclipse party, but they will have to leave their instruments and apparatus in storage, either at Kiev or possibly at Poulkova. Lacking further news, the party is expected to sail from England, as originally planned, on September 22d, and would be due at the observatory about the middle of October.

The news of the failure of the eclipse observations at Kiev, Russia, only reached the Lick Observatory on September 23d. The afternoon was cloudy, and the eclipse was not visible. Evidently a cable sent from the eclipse station on August 21st failed to reach its destination, which contingency was to be anticipated in the troubled condition of affairs in Europe.

Mr. SETH B. NICHOLSON, Instructor in Astronomy in the Berkeley Astronomical Department, University of California, completed his volunteer work at the Lick Observatory on August 3d. During the photographic exposures on the eighth satellite of *Jupiter* with the Crossley reflector, he noted a suspicious object in this region, fainter than any of the satellites hitherto photographed. The object was first identified on the plate of July 21st, and was photographed upon several plates of later dates. Mr. NICHOLSON returned to the Lick Observatory on August 21st, and made several exposures for further positions. His orbit computations have finally confirmed the first indications, given by positions and motions, and the object proves to be a ninth satellite of *Jupiter*. This information was telegraphed to the astronomical world on September 11th. Some of the faint stars, required for the determination of the positions of the new satellite, have been observed with the meridian circle by Acting Director TUCKER.

Miss CARRIE E. CASTLE assumed the duties of secretary of the Lick Observatory on July 7th.

Dr. W. W. COBLENTZ, member of the staff of the Bureau of Standards, Washington, D. C., completed his tests of the thermopiles of his own design, with the Crossley reflector, in August, and left the observatory on September 3d, to resume his work in Washington. In the six weeks spent on the mountain he was able to obtain satisfactory results, both qualitative and quantitative, of the heat of the various classes of stars of different magnitudes. The indications were registered by a most delicate galvanometer, and his entire apparatus is an example of the most advanced types of instrumental construction for investigations in physics, and its allied science, astronomy. He hopes to make further tests with even larger instruments than the Crossley reflector, at some favorable opportunity.

Dr. S. D. TOWNLEY, of Stanford University, has continued his variable star observations with a photometer attached to the 12-inch telescope of the Lick Observatory, during a part of the summer.

Mr. WARREN KIMBALL GREEN, A. B., Harvard University, 1913, began his graduate work as Fellow at the Lick Observatory on July 8th.

Dr. ELI STUART HAYNES, after spending an extra month at the Lick Observatory, left on August 3d to take up his duties at Beloit College.

Father M. SELGA, S. J., of the staff of the Manila Observatory, arrived at Mount Hamilton for volunteer work at the Lick Observatory on August 24th. Father SELGA has spent the past year in American observatories at Harvard, Georgetown and Flagstaff, and will continue his work here during the autumn.

In the latter part of July, while on Mount Wilson, Professor HALE suffered a sudden attack of appendicitis, which necessitated an operation. This was performed with entire success on August 8th. The recovery was rapid, and Professor HALE was able to leave the hospital for his home on September 8th.